

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in Spray Guns.

We, RICHARD ZIPPEL and BERNDT ZIPPEL, both German nationals, trading as RICHARD ZIPPEL & Co., K.G., of Waldkappel, Kr. Eschwege, Western Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The present invention relates to a spray gun which enables a simultaneous discharge of two media from one nozzle in regulated quantities. With particular advantage, the spray gun in accordance with this invention may be used to spray polyester varnish together with a hardening or catalytic agent which should be blended with the varnish at the moment of discharge only.

15 In a known construction of spray gun, one of the media is fed to the nozzle directly from a chamber, and the other is fed through a pipe which serves as a nozzle needle and extends axially through the said chamber, the pipe being axially displaceable by a lever controlling the air supply. This pipe extends from the nozzle body to the handle where it is slidably journaled. A spring, accommodated in the handle and acting on the pipe, tends to force the pipe into a position to close the nozzle through which the first medium is discharged. Feed of the second medium to the pipe is through a connecting piece at the end of the pipe projecting from the handle. At the opening of this connecting piece into the pipe a manually adjustable nozzle needle is provided which allows for a variation of the amount of the second medium until the connecting piece is completely closed.

20 Variations in the supply and a manual shut-off of the second medium is not desirable because it is difficult or even impossible to control this action, during operation. The nozzle for the discharge of the first medium will be closed by the hollow nozzle needle when releasing the operating lever. The

second medium, however, will continue to leave the hollow nozzle needle for a more or less long period. This subsequent discharge of the second medium alone may cause undesired stains on the sprayed surface. The proportion of the hardening or catalytic agent admixed to the polyester varnish must be constant. In the known apparatus, however, the proportion varies according to the operating lever being pressed more or less and the nozzle being opened more or less. In any case, when the nozzle is only slightly opened, a bigger amount of the second medium will be discharged than is necessary to produce the correct mixture. A constant control by means of manual adjustment of the nozzle needle which controls the supply of the second medium is not possible.

25 According to the present invention, this deficiency is eliminated. The improved spray gun comprises an outlet orifice for one medium and a hollow retractable valve member normally closing the same, an outlet orifice in said hollow valve member for the second medium and a retractable valve member normally closing the same, said two orifices being mutually concentric and adjacent, and an operating lever for withdrawing said two valve members simultaneously and with relative movement between them such that both orifices are opened, release of said operating member allowing said valves to re-close the respective orifices.

30 In the preferred arrangements, said operating member is a lever directly actuating one of said valves and also operating a second lever to actuate the other of said valves, the pivots of the two levers being so positioned that the levers have opposite directions of rotational movement, and the point of mutual engagement between the levers may be adjusted to vary the ratio of their rotational movements and thereby vary the ratio of the extents of opening of the two valves.

35 In a particular embodiment, a solid nozzle

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needle is provided which extends throughout a hollow nozzle needle for feeding the second medium, and the solid needle is connected with the operating lever so that when pressing the operating lever, it is displaced together with and also relative to the hollow nozzle needle, the channel to feed the second medium to the hollow nozzle needle being arranged close to the nozzle body, and the bore of the hollow needle being reduced at the rear end so that in this part the solid nozzle needle is sealingly guided. At the rear end the solid needle projects beyond the hollow needle and is indirectly controlled by the operating lever by a second lever arranged on the handle parallel to the operating lever and pivoted at the opposite end as compared with the operating lever. An abutment on the operating lever bears against the second lever, and is axially adjustable so that the leverage of both levers can be varied. According to the adjusted leverage, the relative motion between the solid needle and the hollow needle is different. Another adjustment is also possible in that the operating lever may be pivoted on the handle at different distances from the common axis of the hollow and solid needles. The purpose of this is explained below.—

An example of the invention is illustrated in the accompanying drawing in which the single Figure is a vertical longitudinal section.

As shown, the spray gun comprises a handle portion 1 with a forwardly-projecting member 2 carrying a removable nozzle body 3. Within the handle is a conduit or channel 4 to supply compressed air for the operation of the spray gun, an air shut-off valve 5 being provided in this conduit. The outlet side of the air shut-off valve 5 is in communication with an air distributor on the said nozzle body 3 by means of a pipe which is not illustrated. The interior of the nozzle body 3 forms a chamber 6 into which the polyester varnish or other coating material is fed through a connecting piece 7.

The nozzle body 3 has a paint nozzle 8 at its forward end, to close which a hollow nozzle needle 9 extends axially through the paint chamber 6 in the nozzle body 3. The needle 9 is axially displaceable, and in its rest position its pointed end is forced into a tapered seat 10 in the paint nozzle 8 by means of a spring 11. Inside of, and coaxial with the hollow needle 9 a solid nozzle needle 12 is provided which extends throughout the hollow nozzle needle and which, at its rear end, projects beyond the hollow needle. The bore of the hollow needle 9 at the front portion of the needle is wider than the outer diameter of the solid needle 12, whilst at the rear portion such bore is of the same diameter as the solid needle 12, so that in this part the solid needle 12 is sealingly guided in the hollow needle 9. Outside the nozzle body 3, as seen in the direction towards the handle, a connecting piece 13 is provided on the hollow needle 4 for the feed of the second

spraying medium which, in the case of polyester varnish as the coating medium would be a hardening agent or a catalytic agent for the polyester varnish.

The rear end of the hollow nozzle needle 9 is guided in a sleeve 14 which is slidable, in the handle part 1 of the spray gun. The rear end of the solid needle 12 projects beyond the end of the hollow needle 9 and is fixed to the bottom of the sleeve 14. The spring 11 is arranged inside the sleeve 14 around the part of the solid needle 12 projecting beyond the hollow needle 9. The spring 11 reacts against the bottom of the sleeve 14 and against the end 15 of the hollow needle 9. Thus, the spring 11 tends to force the hollow needle 9 towards the outlet of the nozzle body 3, and urges the tapered front end of the hollow nozzle needle 9 into the tapered seat 10 of the paint nozzle 8 to close the latter. On the other hand, a further spring 16 which is accommodated in the handle part 1 of the spray gun, acts on the end of the sleeve 14, said spring pressing the sleeve and the solid needle 12 which is fixedly connected with the sleeve, towards the outlet of the nozzle body 3. Consequently, the mouth of the hollow needle 9 is closed by means of the end of the solid needle 12. The tapered sealing area at the mouth of the hollow needle 9 and the solid needle 12 is comparatively large. In the rest position therefore both nozzles are held closed by the respective springs 11 and 16.

A trigger 17 is pivoted on the handle part 1 of the spray gun. Its upper part is formed as a fork to enclose the hollow needle 9. The trigger 17 bears against adjusting nuts 18 provided on the hollow needle 9 at the rear of the trigger. By operating the trigger 17, the outer needle 9 is displaced rearwardly, against the action of the springs 11 and 16, towards the handle part 1, and the paint nozzle 8 is opened.

Arranged parallel to the trigger 17, a second lever 19 is provided, this being pivoted at its lower end on the handle part of the spray gun between the trigger 17 and the handle. Thus, the pivot point of the lever 19 is below the common axis of the hollow needle 9 and the solid needle 12. Its free upper end is shaped like a fork and rests against the front end of the slidable sleeve 14. An abutment 20 provided on the trigger 17 below the hollow needle 9 rests against the upper end of the lever 19. By operating the trigger 17, the lever 19 is actuated also. During this movement of the lever 19, the sleeve 14 and the solid needle 12 which is fastened thereto, are forced back. When pulling the trigger 17, the hollow needle 9 and the solid needle 12 are displaced together in the same direction. The abutment 20 is arranged on the trigger 17 in such a way that the solid needle 12 carries out a relative motion with respect to the hollow needle 9, and the mouth of the needle 9 is

thereby opened.

The abutment 20 is adjustable along the trigger 17 so that the respective leverages of the trigger 17 and of the lever 19 are variable.

- 5 The more the abutment 20 is moved away from the pivot point of the trigger 17, the greater is the said relative motion of the solid needle 12 with respect to the hollow needle 9. In this way it is possible to vary the proportion of the medium discharged from the hollow needle 9, i.e. the hardening or catalytic agent, and the amount of the medium discharged from the paint nozzle 8, i.e. the polyester varnish, in a wide extent.
- 10 Preferably, several alternative pivot points 21, 21^a, 21^b are provided for the trigger 17 on the handle part 1 of the spray gun, at different distances from but all above the common axis of the two nozzle needles 9 and 12. The effective length of the lever 17 acting on the hollow needle 9 is different according to the pivot point used for the trigger 17. When varying the position of the abutment 20 on the trigger 17, the lever action is infinitely variable, but when varying the pivot point of the trigger 17, the leverage is varied step by step. Preferably, both these adjusting means are provided on the spray gun, in order to make both a rough and a fine adjustment possible.

30 WHAT WE CLAIM IS:—

1. A spray gun for spraying two media simultaneously from separate orifices in a spray nozzle comprising an outlet orifice for one medium and a hollow retractable valve member normally closing the same, an outlet orifice in said hollow valve member for the second medium and a retractable valve member normally closing the same, said two orifices being mutually concentric and adjacent, and an operating lever for withdrawing said two valve members simultaneously and with relative movement between them such that both orifices are opened, release of said operating member allowing said valves to re-close the respective orifices.

2. A spray gun according to claim 1, wherein said operating member is a lever directly actuating one of said valves and also operating a second lever to actuate the other of said valves, the pivots of the two levers being so positioned that the levers have opposite directions of rotational movement, and wherein the point of mutual engagement between the levers may be adjusted to vary the ratio of their rotational movements and thereby vary the ratio of the extents of opening of the two valves.

3. A spray gun according to claim 2, wherein said second lever when moved to retract the associated valve member also opens the conduit for pressure air.

4. A spray gun according to claim 1, comprising a handle and a nozzle body removably mounted on said handle, said nozzle body being formed with an inner chamber having an orifice from which the first medium can be

discharged, a hollow nozzle needle having an orifice through which the second medium can be discharged and formed of a pipe which extends axially through said chamber in said nozzle body and which is axially displaceable, an operating lever for the air supply, said operating lever controlling the displacement of said hollow nozzle needle, and a solid nozzle needle arranged inside said hollow nozzle needle and extending over the total length of said hollow nozzle needle, said solid nozzle needle being subjected to the action of said operating lever in such a way that by the actuation of said operating lever, said solid nozzle needle is displaced together with and also relatively to said hollow nozzle needle, so that both said orifices become opened.

5. In a spray gun as claimed in claim 4, a pipe to feed one of the media into said hollow nozzle needle, arranged close to said nozzle body, said solid nozzle needle tightly fitting into the part of said hollow nozzle needle behind said pipe and projecting beyond the rear end of said hollow nozzle needle, where it is indirectly controlled by means of said operating lever.

6. In a spray gun as claimed in claim 4, a second lever arranged on said handle parallel to said operating lever and pivoted at the opposite end as compared to said operating lever, and an abutment on said operating lever to bear against said second lever, and said second lever controlling the displacement of said solid nozzle needle.

7. A spray gun as claimed in claim 6, in which said abutment is adjustable on the longitudinal axis of said operating lever to vary the ratio between the angles of rotation of the two levers.

8. A spray gun as claimed in any of claims 4 to 7, in which the effective length of said operating lever is variable in that said operating lever may be pivoted on said handle at different distances from the common axis of said hollow and solid needles.

9. In a spray gun as claimed in claim 4, a sleeve which is displaceable in said handle, a spring arranged between the bottom of said sleeve and the end of said hollow nozzle needle, and a second spring to force said sleeve towards said nozzle body, said solid nozzle needle being fixedly connected to the bottom of said sleeve and the rear end of said hollow nozzle needle sliding in said sleeve.

10. A spray gun according to claim 1 or 4, constructed and adapted for use substantially as the example herein described with reference to and as illustrated in the accompanying drawing.

11. The method of spray coating an article with a polyester finish wherein polyester varnish and a hardener therefor are applied as two media in a spray gun as claimed in any preceding claim.

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